



Coffee Break Training - Fire Protection Series

Automatic Sprinklers: Aboveground Sprinkler Pipe Air Pressure Changes

No. FP-2013-17 April 23, 2013

Learning Objective: The student shall be able to explain the influence of temperature on Bourdon pressure gauges.

Dry pipe and double interlock preaction sprinkler systems should be subjected to a 24-hour air pressure leakage test at 40 pounds per square inch (2.8 bar) before they are placed in service or after significant changes to the pipe network.

The pressure readings often are recorded from the Bourdon gauges that are mounted on the sprinkler riser. A Bourdon gauge is made of a hemispherical tube that is linked to a small, internal coiled spring. As the pressure changes in the tube (due to temperature or water pressure changes), the internal spring is either loosened or more tightly coiled. An attached pointer or needle moves across the face of the gauge where air or water pressure is calibrated.

During the pneumatic test, any leakage that results in a loss of pressure in excess of 1 1/2 psi (0.1 bar) for the 24 hours should be corrected. While this guidance seems simple, the question is what happens when the air temperature changes dramatically from the time the test begins to when it is finalized.

When the test is begun, the sprinkler contractor must provide at least 40 psi (2.8) of air pressure on the system side of the dry pipe valve. The air pressure must be sustained for 24 hours so the inspector can verify the system's condition. During that same time period, the ambient temperature can fluctuate dramatically and affect the results.

A drop in ambient temperature may cause the air in the system to contract, resulting in what may appear to be an artificially low pressure reading on the test gauge. Conversely, an increase in the ambient temperature may cause the test gauge to read more than 40 psi (2.8 bar). This would appear that the system passed the pneumatic test when there may be undetected leaks.

The inspector or sprinkler fitter should document the starting and ending pressures and temperatures so any losses or increases can be calculated accurately. Next week's Coffee Break Training will provide the mathematical formula to find accurate results.

For additional information, refer to National Fire Protection Association 13, *Standard for the Installation of Sprinkler Systems*.



On this dry pipe system, the lower gauge measures the water supply pressure, and the upper gauge measures the air pressure maintained on the sprinkler system.



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